

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

[Claim 1] (Currently Amended)

A mixture supply device for use in a multi-cylinder type of internal-combustion engine, installed on an air inlet pipe adapted to diverge and then re-converge air inlet passageway sections connected to respective cylinders; said mixture supply device comprising:

a first construction block in which a rotary body, a passageway section formed inside said rotary body, and an opening formed on part of an outer periphery of said rotary body are constructed, and

a second construction block in which a passageway section formed inside said rotary body and an opening formed on part of the outer periphery of said rotary body are constructed;

and wherein:

there is formed an air flow control valve provided with a rotating device for rotating said rotary body in a reversibly bi-directional manner, said air flow control valve being further formed with a restricting portion at which restrictions in said two construction blocks each change in shape according to a particular rotary motion of said rotary body;

there is constructed a multiple-throttle mechanism that contains said air flow control valve inside; and

there is provided a fuel spraying device having a fuel spraying port disposed in proximity to the restricting portion in said air flow control valve, and

in said restricting portion,

in a case where said rotary body rotates toward one direction of a first
rotating direction and a second rotating direction, reverse to the first rotating
direction, said restricting portion opens from a side near to a wall surface
portion to said fuel spraying port of said air inlet passageway section in which
said fuel spraying port is disposed, and

in a case where said rotary body rotates toward an opposite direction
of said first rotating direction and said second rotating direction, said
restricting portion opens from a side remote to said wall surface portion to said
fuel spraying port of said air inlet passageway section.

[Claim 2] (Currently Amended)

A mixture supply device according to claim 1, for use in a multi-cylinder type of
internal combustion engine, installed on an air inlet pipe adapted to diverge and then
re-converge air inlet passageway sections connected to respective cylinders; said
mixture supply device comprising:

a first construction block in which a rotary body, a passageway section formed
inside said rotary body, and an opening formed on part of an outer periphery of said
rotary body are constructed, and

a second construction block in which a passageway section formed inside said
rotary body and an opening formed on part of the outer periphery of said rotary body
are constructed;

and wherein:

there is formed ansaidrestricting portion of saidair flow control valve provided
with a restricting portion at whichis constructed so thatsaidrestrictions in said two
construction blocks change in shape so as to differ from each other according to a

particular to the particular rotary motion of said rotary body; body.

~~there is constructed a multiple-throttle mechanism that contains said air flow control valve inside; and~~

~~there is provided a fuel spraying device having a fuel spraying port disposed in proximity to the restricting portion in said air flow control valve.~~

[Claim 3] (Original)

A mixture supply device for use in a multi-cylinder type of internal-combustion engine, installed on an air inlet pipe adapted to diverge and then re-converge air inlet passageway sections connected to respective cylinders; said mixture supply device comprising:

a first construction block in which a rotary body, a passageway section formed inside said rotary body, and an opening formed on part of an outer periphery of said rotary body are constructed, and

a second construction block in which a passageway section formed inside said rotary body and an opening formed on part of the outer periphery of said rotary body are constructed;

and wherein:

there is formed an air flow control valve provided with a restricting portion at which restrictions in said two construction blocks change in shape so as to differ from each other according to a particular rotary motion of said rotary body;

there is constructed a multiple-throttle mechanism that contains said air flow control valve inside;

there is provided a fuel spraying device having a fuel spraying port disposed in proximity to the restricting portion in said air flow control valve; and

a recirculated-exhaust entry port is disposed in proximity to the restricting portion in said air flow control valve, and an exhaust recirculating mechanism is

provided, so that controlled inlet air, sprayed fuel particles, and recirculated exhaust are mixed near a downstream side of the restricting portion.

[Claim 4] (Original)

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein two restrictions are constructed in a rotational direction of said air flow control valve.

[Claim 5] (Original)

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein, for one restriction in said air flow control valve, a rotational angle of said rotary body is set to ensure that an outlet direction of inlet air faces the vicinity of said fuel spraying port and that a high-speed air stream is supplied to the vicinity of said fuel spraying port and then made to collide with a fuel injection stream sprayed therefrom.

[Claim 6] (Original)

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein the opening in the first construction block and the opening in the second construction block are formed with different sizes, both openings being disposed so as to differ in a direction of opening.

[Claim 7] (Previously Presented)

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein said air flow control valve has guide grooves, one in an axially circumferential direction of a rotational axis of said valve and the other in a longitudinal direction, the axially circumferential guide groove being formed with arc-

like sealing members communicating between adjacent inlet passageways in order to block flow routes for the air moving therethrough, and the longitudinal guide groove being formed with bar-like movable sealing members to block flow routes for the air leaking from an upstream side of said valve to a downstream side thereof under a fully closed valve state.

[Claim 8] (Original)

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein said air flow control valve has parallel guide grooves in an axially circumferential direction of a rotational axis of said control valve, said flow control valve further containing, therein, movable sealing members each capable of moving inside a guide groove in order to reduce the flow rate of the air leaking from an upstream side of said valve to a downstream side thereof; and wherein each movable sealing member is pressed in a reducing direction of an air flow route clearance by an air pressure difference occurring between the upstream and downstream of said control valve, depending on whether said control valve is fully closed or remains almost closed, and the movable sealing member thereby comes into contact with a mating surface to create a contact sealing effect for blocking the air flow route clearance, and when said air pressure difference is small, yields a variable sealing effect so as to mainly produce a non-contact sealing effect.

[Claim 9] (Original)

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein said air flow control valve has a deformed section whose cross-sectional area is particularly small; and wherein, depending on an air pressure difference occurring between an upstream and downstream of said control valve under a fully closed or almost closed valve state, a body of said valve, or

particularly, its deformed section is deformed and hereby a sealing section provided in said valve is pressed in a reducing direction of an air flow route clearance, with the result that the sealing section thereby comes into contact with a mating surface to create a contact sealing effect for blocking the air flow route clearance around said valve, and when said air pressure difference is small, yields a variable sealing effect so as to mainly produce a non-contact sealing effect.

[Claim 10] (Previously Presented)

The mixture supply device for an internal-combustion engine, defined in any one of claims 1 to 3; wherein arc-like sealing members and movable sealing members installed in said air flow control valve are constructed of fluorinated resin, polyether-ether-ketone resin, polyimide resin, polyamide resin, polyphenylene sulfide resin, and a resin material formed mainly from these substances.

[Claims 11-13] - (Canceled without prejudice or disclaimer).

Please add new claims 14-18.

[Claim 14] (New) A mixture supply device for use in a multi-cylinder type of internal-combustion engine, installed on an air inlet pipe adapted to diverge and then re-converge air inlet passageway sections connected to respective cylinders; said mixture supply device comprising:

a first construction block in which a rotary body, a passageway section formed inside said rotary body, and an opening formed on part of an outer periphery of said rotary body are constructed, and

a second construction block in which a passageway section formed inside said rotary body and an opening formed on part of the outer periphery of said rotary body

are constructed;

and wherein:

there is formed an air flow control valve provided with a rotating device for rotating said rotary body in a reversibly bi-directional manner, said air flow control valve being further formed with a restricting portion at which restrictions in said two construction blocks each change in shape according to a particular rotary motion of said rotary body;

there is constructed a multiple-throttle mechanism that contains said air flow control valve inside; and

there is provided a fuel spraying device having a fuel spraying port disposed in proximity to the restricting portion in said air flow control valve,

wherein the opening in the first construction block and the opening in the second construction block are formed with different sizes, both openings being disposed so as to differ in a direction of opening.

[Claim 15] (New) A mixture supply device for use in a multi-cylinder type of internal-combustion engine, installed on an air inlet pipe adapted to diverge and then re-converge air inlet passageway sections connected to respective cylinders; said mixture supply device comprising:

a first construction block in which a rotary body, a passageway section formed inside said rotary body, and an opening formed on part of an outer periphery of said rotary body are constructed, and

a second construction block in which a passageway section formed inside said rotary body and an opening formed on part of the outer periphery of said rotary body are constructed;

and wherein:

there is formed an air flow control valve provided with a rotating device for

rotating said rotary body in a reversibly bi-directional manner, said air flow control valve being further formed with a restricting portion at which restrictions in said two construction blocks each change in shape according to a particular rotary motion of said rotary body;

there is constructed a multiple-throttle mechanism that contains said air flow control valve inside; and

there is provided a fuel spraying device having a fuel spraying port disposed in proximity to the restricting portion in said air flow control valve,

wherein said air flow control valve has guide grooves, one in an axially circumferential direction of a rotational axis of said valve and the other in a longitudinal direction, the axially circumferential guide groove being formed with arc-like sealing members communicating between adjacent inlet passageways in order to block flow routes for the air moving therethrough, and the longitudinal guide groove being formed with bar-like movable sealing members to block flow routes for the air leaking from an upstream side of said valve to a downstream side thereof under a fully closed valve state.

[Claim 16] (New) A mixture supply device for use in a multi-cylinder type of internal-combustion engine, installed on an air inlet pipe adapted to diverge and then re-converge air inlet passageway sections connected to respective cylinders; said mixture supply device comprising:

a first construction block in which a rotary body, a passageway section formed inside said rotary body, and an opening formed on part of an outer periphery of said rotary body are constructed, and

a second construction block in which a passageway section formed inside said rotary body and an opening formed on part of the outer periphery of said rotary body are constructed;

and wherein:

there is formed an air flow control valve provided with a rotating device for rotating said rotary body in a reversibly bi-directional manner, said air flow control valve being further formed with a restricting portion at which restrictions in said two construction blocks each change in shape according to a particular rotary motion of said rotary body;

there is constructed a multiple-throttle mechanism that contains said air flow control valve inside; and

there is provided a fuel spraying device having a fuel spraying port disposed in proximity to the restricting portion in said air flow control valve,

wherein said air flow control valve has parallel guide grooves in an axially circumferential direction of a rotational axis of said control valve, said flow control valve further containing, therein, movable sealing members each capable of moving inside a guide groove in order to reduce the flow rate of the air leaking from an upstream side of said valve to a downstream side thereof; and wherein each movable sealing member is pressed in a reducing direction of an air flow route clearance by an air pressure difference occurring between the upstream and downstream of said control valve, depending on whether said control valve is fully closed or remains almost closed, and the movable sealing member thereby comes into contact with a mating surface to create a contact sealing effect for blocking the air flow route clearance, and when said air pressure difference is small, yields a variable sealing effect so as to mainly produce a non-contact sealing effect.

[Claim 17] (New) A mixture supply device for use in a multi-cylinder type of internal-combustion engine, installed on an air inlet pipe adapted to diverge and then re-converge air inlet passageway sections connected to respective cylinders; said mixture supply device comprising:

a first construction block in which a rotary body, a passageway section formed inside said rotary body, and an opening formed on part of an outer periphery of said rotary body are constructed, and

a second construction block in which a passageway section formed inside said rotary body and an opening formed on part of the outer periphery of said rotary body are constructed;

and wherein:

there is formed an air flow control valve provided with a rotating device for rotating said rotary body in a reversibly bi-directional manner, said air flow control valve being further formed with a restricting portion at which restrictions in said two construction blocks each change in shape according to a particular rotary motion of said rotary body;

there is constructed a multiple-throttle mechanism that contains said air flow control valve inside; and

there is provided a fuel spraying device having a fuel spraying port disposed in proximity to the restricting portion in said air flow control valve,

wherein said air flow control valve has a deformed section whose cross-sectional area is particularly small; and wherein, depending on an air pressure difference occurring between an upstream and downstream of said control valve under a fully closed or almost closed valve state, a body of said valve, or particularly, its deformed section is deformed and hereby a sealing section provided in said valve is pressed in a reducing direction of an air flow route clearance, with the result that the sealing section thereby comes into contact with a mating surface to create a contact sealing effect for blocking the air flow route clearance around said valve, and when said air pressure difference is small, yields a variable sealing effect so as to mainly produce a non-contact sealing effect.

[Claim 18] (New) A mixture supply device for use in a multi-cylinder type of internal-combustion engine, installed on an air inlet pipe adapted to diverge and then re-converge air inlet passageway sections connected to respective cylinders; said mixture supply device comprising:

a first construction block in which a rotary body, a passageway section formed inside said rotary body, and an opening formed on part of an outer periphery of said rotary body are constructed, and

a second construction block in which a passageway section formed inside said rotary body and an opening formed on part of the outer periphery of said rotary body are constructed;

and wherein:

there is formed an air flow control valve provided with a rotating device for rotating said rotary body in a reversibly bi-directional manner, said air flow control valve being further formed with a restricting portion at which restrictions in said two construction blocks each change in shape according to a particular rotary motion of said rotary body;

there is constructed a multiple-throttle mechanism that contains said air flow control valve inside; and

there is provided a fuel spraying device having a fuel spraying port disposed in proximity to the restricting portion in said air flow control valve,

wherein arc-like sealing members and movable sealing members installed in said air flow control valve are constructed of fluorinated resin, polyether-ether-ketone resin, polyimide resin, polyamide resin, polyphenylene sulfide resin, and a resin material formed mainly from these substances.